BS EN 10245-1:2011

BSI Standards Publication

Steel wire and wire products — Organic coatings on steel wire

Part 1: General rules

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National foreword

This British Standard is the UK implementation of EN 10245-1:2011. It supersedes BS EN 10245-1:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/106, Wire Rod and Wire.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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This European Standard was approved by CEN on 17 September 2011.

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Foreword

This document (EN 10245-1:2011) has been prepared by Technical Committee ECISS/TC 106 “Wire rod and wires”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10245-1:2001.

This standard is made up of the following parts:

— *Part 1: General Rules*;

— *Part 2: PVC finished wire*;

— *Part 3: PE coated wire*;

— *Part 4: Polyester coated wire*;

— *Part 5: Polyamide coated wire*.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard for organic coatings for steel wire covers the requirements of a general nature and applies also to coatings for which no specific requirements have been established in the subsequent parts of this standard.

The subsequent parts of this standard deal more specifically with clearly defined coatings or groups of coatings. These coatings may have their own particular methods of application and their individual requirements which are specified in these parts of this standard, in other standards or in manufacturers data sheets.

Because the standard specifies requirements and tests not only for the coating but also for the coating material, it has proved not practical to put all the requirements in one clause and all the tests in another one. Following structure has been chosen in order to limit complexity and to facilitate the use.

In writing this series of standards consideration has been given to the nomenclature and transformation of organic coating materials as applied to steel wire products. These organic coating materials may, on application to wire and by their integration into the finished wire product, change their characteristics and properties.

This standard specifies characteristics and tests not only for the organic coating but also for the coating materials both before and after their application to steel wire and wire products. In addition it specifies the requirements for performance levels and testing methods on organic coating material which have become an integral and permanent part of the finished wire product. Therefore it has proven not to be practical to put all requirements in one clause and all the tests in another one.

To aid continuity and in order to limit complexity, the following structure has been chosen for this standard:

— **Clause 4** deals with the characteristics and testing methods of organic coating material as supplied by the manufacturer for the purposes of its application to the wire product.

  Tests described in this section are intended to be carried out by the organic coating material manufacturer or the applicator **before** the coating operation.

— **Clause 5** relates to the characteristics and testing methods for the "organic coating" when the organic coating material has been applied to and has become an integral part of the finished wire. Consequently tests are intended to be in the main carried out by the coating "applicators".

— **Clause 6** defines the performance requirements and testing methods on the "organic coating" of the finished wire product, and where this is not possible, tests will be carried out on "coated" panels.

1 Scope

This European Standard specifies the requirements for the characteristics and testing methods for organic coatings made of organic coating material suitable for the application on to steel wire and wire products of circular or other sections.

Other organic materials which are applied intentionally or otherwise such as oils, greases, waxes and temporary finishes which do not become integral or a permanent part of the finished wire product are excluded from this standard

This European Standard is divided in a number of parts, with Part 1 covering the requirements of a general nature and applies to organic coatings and coating material for which no specific requirements have been established in the subsequent parts of prEN 10245.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10021:2006, *General technical delivery conditions for steel products*

EN 10218-1, *Steel wire and wire products — General — Part 1: Test methods*

EN 10218-2, *Steel wire and wire products — General — Part 2: Wire dimensions and tolerances*

EN 50395, *Electrical test methods for low voltage energy cables*

EN 50396, *Non electrical test methods for low voltage energy cables*

EN ISO 105-A08:2002, *Textiles — Tests for colour fastness — Part A08: Vocabulary used in colour measurement (ISO 105-A08:2001)*

EN ISO 527-1*, Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1:1993 including Corr 1:1994)*

EN ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*

EN ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

EN ISO 877 (all parts), *Plastics — Methods of exposure to solar radiation*

EN ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2004)*

EN ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method (ISO 1183-2:2004)*

EN ISO 1183-3, *Plastics — Methods for determining the density of non-cellular plastics — Part 3: Gas pyknometer method (ISO 1183-3:1999)*

EN ISO 2808, *Paints and varnishes — Determination of film thickness (ISO 2808:2007)*

EN ISO 2811-1, *Paints and varnishes — Determination of density — Part 1: Pyknometer method (ISO 2811-1:2011)*

EN ISO 2811-2, *Paints and varnishes — Determination of density — Part 2: Immersed body (plummet) method (ISO 2811-2:2011)*

EN ISO 2811-3, *Paints and varnishes — Determination of density — Part 3: Oscillation method (ISO 2811-3:2011)*

EN ISO 2811-4, *Paints and varnishes — Determination of density — Part 4: Pressure cup method (ISO 2811-4:2011)*

EN ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°(ISO 2813:1994, including Technical Corrigendum 1:1997)*

EN ISO 3668, *Paints and varnishes — Visual comparison of the colour of paints (ISO 3668:1998)*

EN ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance (ISO 4892-1:1999)*

EN ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps (ISO 4892-2:2006)*

EN ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps (ISO 4892-3:2006)*

EN ISO 6270-1, *Paints and varnishes — Determination of resistance to humidity — Part 1: Continuous condensation (ISO 6270-1:1998)*

EN ISO 6270-2, *Paints and varnishes — Determination of resistance to humidity — Part 2: Procedure for exposing test specimens in condensation-water atmospheres (ISO 6270-2:2005)*

EN ISO 6988, *Metallic and other non-organic coatings — Sulfur dioxide test with general condensation of moisture (ISO 6988:1985)*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2006)*

ISO 1512, *Paints and varnishes — Sampling of products in liquid or paste form*

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*

ISO 7724-2, *Paints and varnishes — Colorimetry — Part 2: Colour measurement*

ISO 7724-3, *Paints and varnishes — Colorimetry — Part 3: Calculations of colour differences*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
organic coating
layer of organic coating material when deposited intentionally onto the wire/wire product substrate in a clearly specified manner

NOTE On becoming an integral part of the wire product the "organic coating" will impart specific functional and performance characteristics. The organic coating material may be applied directly to the surface of the steel wire or subsequent to a pre-treatment of the steel wire surface with a primary coating which can consist of inorganic or organic materials. For the purpose of this definition the steel wire/wire product may be coated with a non-ferrous metallic coating or not.

3.2
organic coating material
material made essentially of organic compounds capable of covering the steel wire surface after suitable preparation

NOTE The "organic coating materials" generally contain other matter such as pigments, fillers, plasticisers, lubricants and other additives which are specific to each organic coating material composition.

The organic coating materials may be applied using a liquid solution containing organic products capable of covering the surface with the desired organic coating material.

The organic coating material may also be applied in the solid form, e.g. powder or in the form of granules. A powder coating is generally applied by depositing the powder on the wire/wire product and then sintering by melting the powder onto the wire product. Granules are applied to a wire by feeding them into an extruder and extruding the "organic coating" onto the wire substrate.

Organic coating materials can be subdivided into several groups each having its own characteristic method of application.

3.2.1
thermoplastics materials
materials having the specific property of softening when heated and hardening or solidifying when cooled, which as a process is reversible and allows a certain degree of recycling or reprocessing of the material

NOTE These materials include PVC, nylon, polyethylene, polypropylene and the copolymer vinyl ethylene acetate.

These materials may be applied by one of the following methods: electrostatic spraying, fluidized bed or extrusion.

3.2.2
thermosetting materials
materials having the property of changing into much more infusible and insoluble product when hot polymerized by methods such as radiation, catalysts. etc.

NOTE Once polymerized and made insoluble they cannot be remelted. These materials include polyester and epoxy coatings. These materials are typically applied by electrostatic powder spray.

3.2.3
plastisols/organosols
suspension of fine particles of inorganic materials such as resins, PVC, etc carried in an organic fluid or solvents

NOTE After immersion or spraying, exposure to heat causes the plastisol to melt to form a solid continuous flexible organic coating.

3.2.4
paint
material coloured with organic and sometimes inorganic components, dispersed in oils or water

NOTE They are applied in liquid form to the surface of the wire and after air drying they form a continuous adherent film on the wire. Application is by brush, roller or spray (electrostatic or atmospheric) or by immersion.

3.2.5
varnish
generally organic materials which are transparent or coloured with an oil, resin and solvent base, which are then air dried

NOTE Application is the same as for paints (see 3.2.4).

3.2.6
lacquer
synthetic organic transparent or coloured coating which generally dries to form a film after evaporation of the solvent

3.3
test piece
part of the sample, with specified dimensions, machined or un-machined, brought to a required condition for submission to a given test

NOTE In certain cases, the test piece can be the sample itself or the rough specimen.

3.4
significant surface
part of the total surface over which it shall be ensured that the "organic coating" complies with the specific requirements of the Standard

3.5
pre-treatment
operation carried out on the wire/wire products before the final application of the organic coating material

3.6
shelf life
period during which an organic coating material, securely packaged and stored according to the manufacturer's recommendations, may be kept from the time of manufacture to the actual use by the applicator and still retain the characteristics and properties as specified

3.7
meltflow index
rate of extrusion of molten resins through a die of specified length and diameter under prescribed conditions of load and piston position in the barrel as the timed measurement is being made

3.8
manufacturer
organisation which manufactures the organic coating material

3.9
applicator
organisation which applies the organic coating material to the wire/wire product and transforms it into an organic coating which is an integral part of the finished wire product

3.10
specifier
organisation issuing a contract specifying the particular properties and performance requirements of a finished wire/wire products covered with an organic coating

NOTE The specifier is usually the purchaser of the finished wire product.

4 Requirements and testing methods for the organic coating material

4.1 General

Many characteristics of organic coating materials prove difficult to measure. This is why a good number of characteristics in this European Standard relate to requirements for organic coating materials as supplied by the manufacturer. The manufacturer's data sheet may supply many of these characteristics. They shall also give the necessary information for traceability of the materials.

4.2 Requirements

4.2.1 Composition

The manufacturer shall supply reference data for the qualification of the material. The organic coating material shall comply with the compositional characteristics specified at the time of the order. The specifications commonly include quantities and type of pigments, plasticizers, lubricants and other organic and inorganic materials agreed mutually.

The manufacturer shall immediately notify the applicator of any subsequent change in the type and quantity of the constituent parts of the composition once this has been agreed between the two parties. The manufacturer shall also provide appropriate information for easy identification of the batches supplied.

4.2.2 Colour

The characteristics shall be agreed at the time of ordering between the manufacturer, applicator and specifier/purchaser using the methods described in 4.3.2.

Unless otherwise specified at the enquiry and order, the colour difference of coating material and component colour differences shall be within the following limits:

ΔE: 5 max.

ΔL: 1,5 max.

Δa: 3 max.

Δb: 3 max.

where

ΔE is the colour-difference evaluation; single number defining the total colour difference between a test specimen and its reference specimen (see EN ISO 105-A08:2002, 2.11);

ΔL is the lightness-darkness difference (see EN ISO 105-A08:2002, 2.2, Note);

Δa is the redness-greenness difference (see EN ISO 105-A08:2002, 2.2, Note);

Δb is the yellowness-blueness difference (see EN ISO 105-A08:2002, 2.2, Note).

4.2.3 Apparent density

The density and/or the apparent density of the powders may be agreed between the manufacturer, the applicator and the supplier and shall be expressed in g/dm^3.

4.2.4 Hardness

The hardness of the organic coating material may be agreed between the manufacturer, the applicator and the specifier at the time of the order.

4.2.5 Tensile strength and elongation

The properties of the organic coating material when in solid form may be agreed between manufacturer, applicator and specifier at the time of the order.

4.2.6 Shelf life

The shelf life requirements may be agreed between manufacturer and applicator at the time of the order.

4.2.7 The melt flow characteristics (extrusion index)

May be agreed between manufacturer and applicator where extrudable organic coating material is ordered.

The method of verification shall be agreed between the parties.

4.3 Test methods for organic coating materials as supplied by the manufacturer

4.3.1 General

The tests described in this section are intended to be carried out by the manufacturer or the applicator on the coating material prior to the coating operation.

Because of the difficulty of measuring some of the characteristics of coating material on powders or granules and also when these materials are applied to wire products, the tests shall be carried out on specially prepared samples. This applies in particular for the measurement of the density, the tensile strength and elongation, the hardness.

The samples shall be prepared by compressing and heating a quantity of powder or granules at the melting temperature. After cooling samples shall be cut open to check for air bubbles and trapped air. If present, the sample shall be discarded and the test repeated until the sample is free from air bubbles.

4.3.2 Colour

This shall be assessed either by visual comparison with an agreed standard using the method described in EN ISO 3668 or by instrumental measurements of the colour co-ordinates of a standard and a representative test piece using the method described in ISO 7724-2 and ISO 7724-3.

4.3.3 Density

4.3.3.1 Method for determining the density of organic coating material

4.3.3.1.1 General

Powders, granules, pellets or moulded organic coating material shall be tested in accordance with the methods detailed in EN ISO 1183-1, -2 and -3.

Because of the difficulty of measuring the density on the materials as supplied, tests shall be carried out on specially prepared samples as described in 4.3. On cooling, the pressed shape of solid plastic material shall have its volume and mass measured, in order to calculate its density. After measuring their mass the samples shall be cut open to check for air bubbles, and trapped air.

The density of some organic coating materials is affected by ageing, in such cases the parties shall agree on the time lapse for the tests to be carried out after the compressed samples have been prepared.

4.3.3.1.2 Apparent density of powders for coating

In the case of powders the apparent density shall be determined by passing the powder through a fine sieve into a graduated vessel, which has previously been weighed, until 250 ml is reached. The graduated vessel is then weighed, and the apparent density in g/dm^3 is calculated.

4.3.3.2 Method for the determination of the density of liquid organic coating materials

Sampling shall be carried out in accordance with ISO 1512. Testing for density shall be in accordance with EN ISO 2811-1, -2, -3 and -4. The density shall be determined by pouring the liquid coating material into a graduated vessel to the 250 ml mark. Weigh the vessel and determine the weight in grams. Multiply this mass by 4 and the result obtained corresponds to the density in g/dm^3.

4.3.4 Method for determining Shore Hardness of organic coating material

The Shore Hardness shall be determined in accordance with EN ISO 868 stating the appropriate scale A or D.

4.3.5 Method for determining the tensile strength and elongation

This shall be determined in accordance with EN ISO 527-1 and -2. The strain rate shall be 100 mm/min or to special agreements between the parties.

5 Requirements and testing methods for the organic coating on wire

5.1 General

This section applies to the requirements and testing methods of the "organic coating" when the organic coating material has been applied to the steel wire/wire products and has become a permanent and integral part of the finished wire product. Tests are usually carried out by the applicator or specifier.

5.2 Requirements

5.2.1 Appearance of organic coating

The organic coating shall be continuous, smooth and distributed as uniformly as industrial technology allows. No blistering, craters, marks, holes or scratches shall be visible to the naked eye. Small dents not affecting subsequent use, and resulting from contact with adjacent turns shall not be considered to be a cause for rejection.

5.2.2 Colour

The colour of the finished coating shall be specified by purchaser at the time of enquiry and ordering and shall be identified and correspond to the supplied reference colour sample supplied or to the colour reference (e.g. R.A.L.).

5.2.3 Gloss

The surface gloss may also be specified at the time of ordering using the criteria for specular gloss according to EN ISO 2813.

5.2.4 Thickness of organic coating

The thickness of the organic coating layer shall be as specified at the time of enquiry and ordering.

5.2.5 Adherence of organic coating

The organic coating at the time of ordering may be specified without an adherence requirement or alternatively adherence properties and method of testing shall be specified (e.g. grade of adherence according to 5.3.5) in the relevant product standard or at the moment of enquiry and order.

5.2.6 Resistance to impact (mechanical shock)

The requirement of the organic coating to resist mechanical shock shall be specified at the time of ordering. Mechanical shock resistance is characterised by an agreed transition temperature between ductile and brittle behaviour in a specified impact test.

5.2.7 Spark testing

The organic coating shall be free of pinholes and other discontinuities. During the application of a specified electrical potential difference between the wire/product and a flexible contact, with the coating acting as an insulator, any degree of sparking indicates the presence of holes or discontinuities.

For some organic coating material a minimum thickness of the coating is required in order to carry out meaningful spark testing. This needs to be specified at the time of ordering.

5.3 Testing methods

5.3.1 Appearance of the organic coating

The appearance of the surface of the finish shall be assessed visually. The significant surface shall be illuminated as in the method described in EN ISO 3668.

5.3.2 Colour

The colour of the finish shall be assessed in accordance with the method described in EN ISO 3668 (visual comparison) and/or ISO 7724-2 and ISO 7724-3 (Instrumental Classification).

5.3.3 Gloss

The specular gloss at 20°, 60° and 85° (angles of light incidence) shall be determined using the method described in EN ISO 2813. Where agreed at the moment of enquiry and ordering, the test may be performed only at 60°.

5.3.4 Thickness of the organic coating

5.3.4.1 Thickness of organic coatings applied in the liquid phase

For organic coating material applied in the liquid phase the method of testing of the finish shall be in accordance to EN ISO 2808.

5.3.4.2 Thickness and concentricity of extruded or sintered coatings

5.3.4.2.1 General

The organic coating material applied by extrusion or sintering the thickness and concentricity of the finish shall be measured by the method described below.

5.3.4.2.2 Measurement of the organic coating on the wire

The diameter of the coated wire shall be measured in accordance with EN 10218-2. Thickness and concentricity shall be measured on a sample with no roughness or local imperfections. The test will start with the determination of the thickness of the coating.

Measure the diameter of the coated wire D in a specific section (see Figure 1).

Remove the coating from the one side of the wire down to the underlying substrate and measure the remaining diameter d_1. The coating thickness is $D\text{-}d_1=a_1$. Remove the coating from the other side of the wire (at 180°) and measure the diameter of the underlying wire (d). The result obtained is a coating thickness $a_2 = d_1\text{-}d$.

Thickness a_3 and a_4 are measured in the same way at 90° from the previous measurements. The coating thickness is the mean of a_1, a_2, a_3, a_4.

The relationship between the smallest thickness and the largest thickness is called the degree of concentricity and is expressed as a percentage.

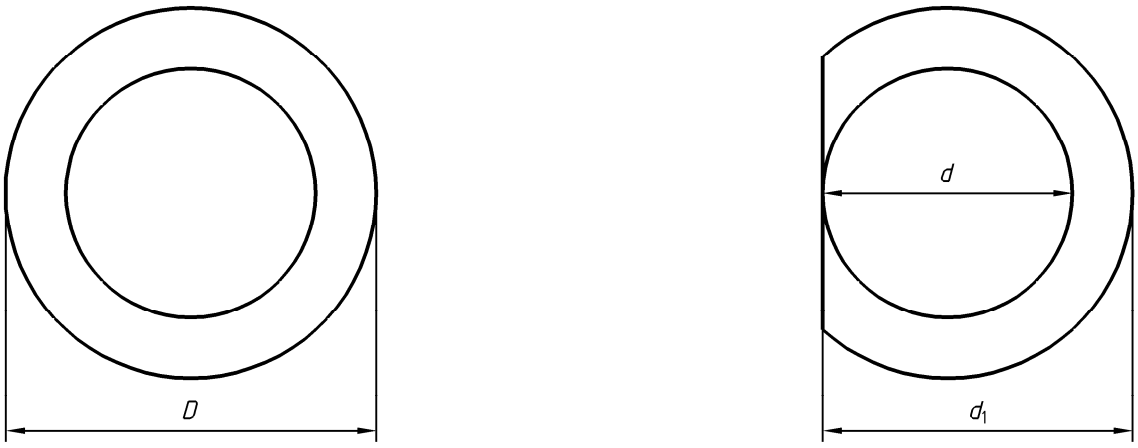
For example:

a_1 = 0,15 mm; a_2 = 0,12 mm; a_3 = 0,16 mm; a_4 = 0,15 mm

degree of concentricity: 0,12 mm/0,16 mm x 100 = 75 %

This procedure constitutes a practical method for evaluating the concentricity of the coating. It is possible to determine the concentricity more accurately in one section by visual method. In this case a sample is fixed in a metallographic mounting and the section assessed under enlargement-preferably 50 times. The minimum and maximum thickness of the coating are determined and measured. The relationship between the values gives the degree of concentricity. In the event of dispute, the visual method shall prevail.

At the present time, direct monitoring of the thickness and concentricity of the coating are becoming more widely accepted. If this is the case, the parties shall agree on the method of processing the results.



Key

D is the diameter of the coated wire

d is the diameter of the underlying wire (with its possible metallic coating)

d_1 is the remaining diameter

Figure 1

5.3.4.2.3 Measurement on organic coated wire products

The diameter of the wire shall be measured in accordance with EN 10218-2.

The procedure is the same as for 5.3.4.2.2; however, in the case of flat product (for example mesh for fencing), the determination shall be carried out on a section of wire between two crossing points. Two thickness measurements shall be taken in the plane of the mesh (a_1 and a_2) and the other two shall be perpendicular to the plane of the product.

5.3.5 Adherence test

5.3.5.1 General

The adherence shall be determined either by means of a wrapping test or by assessing the difficulty of removing the organic coating by a mechanical procedure as specified at the time of ordering.

5.3.5.2 Wrapping test

This shall be carried out using the method described in EN 10218-1.

5.3.5.3 Assessment of the adherence of the finish by mechanical procedure

The procedure for testing adherence is as follows. Use a sharp knife to remove the organic coating in a longitudinal direction along a length of approximately 5 cm on two diametrically opposite sides of the wire. Use the back of the knife to lift a small portion of the coating, grasp with the fingers and try to tear the coating off. Allocate a value of 0 to 5 to the adherence, depending on the behaviour of the coating.

0 impossible to tear off the coating; the lifted portion breaks.

1 impossible to unstick the coating further; very small portions can only be unstuck using a knife.

2 only small particles less than 1 cm can be removed.

3 if you are careful you can remove pieces several cm long.

4 you can very easily remove several cm of coating.

5 the coating film no longer adheres once the coating has been cut at each side of the wire.

5.3.6 Impact resistance (mechanical shock)

Where the impact resistance is checked, the method of testing shall be agreed at the time of enquiry and order.

5.3.7 Spark test

The spark test shall be carried out in accordance with EN 50395 and EN 50396.

6 Performance tests for the organic coating

6.1 General

The performance requirements and testing methods on the organic coating of the finished wire product are described. Tests may be carried out on the finished wire product or where this is impractical on test panels coated with the organic coating material.

6.2 Performance requirements

6.2.1 General

The assessment of performance of the organic coated wire or wire product is to determine the long term behaviour in use under the influence of various weather and environmental conditions. In the tests generally samples of organic coated product are subjected to one of the parameters which might influence the characteristics of the organic coating e.g. UV light, humidity, artificial weathering, etc.

Two types of testing to simulate and determine long term behaviour may be used and should be specified at the time of ordering.

a) Long term testing which may involve a period of time similar to the intended usage time of the finished wire product;

b) Accelerated testing — There is a need to obtain more rapid information as the performance behaviour. This can be used but both the applicator and specifier should be aware that correlation between long term and accelerated testing is not absolute nor fully understood.

When the assessment of performance of the organic coated wire product is to be determined it shall be specified at the time of the enquiry and order. The method to be used and the acceptance level shall be agreed at the time of enquiry and ordering.

6.2.2 Accelerated exposure test to artificial light (resistance to weathering)

The requirements for exposure to artificial light shall be expressed as the minimum number of hours of exposure without significant deterioration or degradation in terms of appearance, colour stability, gloss, adhesion or impact resistance and shall be assessed using ISO 4582.

6.2.3 Accelerated exposure to salt spray

This requirement shall be expressed in terms of the minimum number of hours of exposure to the salt spray test without significant deterioration in terms of appearance, colour and other specified properties.

6.2.4 Accelerated exposure to humidity

This requirement shall be expressed in terms of the minimum number of hours of exposure to conditions of humidity without significant deterioration in terms of specified properties.

6.2.5 Accelerated exposure to humid atmospheres containing levels of sulphur dioxide

This requirement shall be expressed in terms of the minimum number of hours of exposure to a sulphur dioxide loaded humid atmosphere without significant deterioration in the specified properties.

6.2.6 Resistance to natural weathering (long term)

This requirement shall be defined by the period of time that the finished wire product withstands natural weathering without significant deterioration of specified properties as assessed using ISO 4582. The conditions of the test and the acceptance criteria for the specified properties shall be agreed at the time of ordering if this requirement and test is needed in addition to the accelerated exposure tests.

6.3 Performance testing

6.3.1 General

Testing of the performance characteristics shall be carried out by the applicator. In the case of a dispute an acceptable third party should be agreed to act as a referee between the parties.

6.3.2 Test for accelerated artificial light exposure

The test to determine this requirement shall be in accordance with EN ISO 4892-1. The conditions of test shall be agreed at the time of ordering.

a) Type of light source - Xenon arc according to EN ISO 4892-2 is the preferred choice, also QUV (A) or QUV (B) according to EN ISO 4892-3;

b) test enclosure;

c) black panel temperature, the preferred choices being:

   1) 45 ± 3 °C

   2) 55 ± 3 °C

   3) 63 ± 3 °C

d) the relative humidity, these should preferably be:

1) 35 ± 5 %

2) or 50 ± 5 %

3) or 65 ± 5 %

4) or 90 ± 5 %

e) cycling conditions - To simulate natural weathering, cycles of rain (water spray) or darkness (night), may be agreed by the interested parties;

f) the agreed number of hours of light, darkness and total exposure time.

6.3.3 Accelerated test for exposure to salt spray

The test shall be carried out in accordance to the conditions laid down in EN ISO 9227.

6.3.4 Accelerated exposure test for resistance to humidity

The test shall be carried out in accordance with EN ISO 6270-1 and -2.

6.3.5 Accelerated exposure test for resistance to sulphur dioxide in a humid atmosphere

Test shall be carried out in accordance with EN ISO 6988.

6.3.6 Long term natural weathering test

The test shall be carried out in accordance with the conditions laid down in EN ISO 877 (all parts).

7 Retests

The retest procedure shall be in accordance with the relevant clauses of EN 10021.

8 Inspection and Quality assurance

Inspection shall be in accordance with the procedures defined in EN 10021. Compliance with the requirements of this standard may be based on a certificate of compliance submitted by the "manufacturer" or "applicator", and/or on inspection documents according to EN 10204 or similar drawn up at the time of inspection by the applicator or wire product manufacturer, or any other similar document based on the quality assurance and quality control system operated by the applicator or wire products manufacturer.

In any case it is recommended for the purposes of traceability that the batch number and inspection references be given.

Bibliography

[1] EN 10204, *Metallic products — Types of inspection documents*

[2] EN 10245-2, *Steel wire and wire products — Organic coatings on steel wire — Part 2: PVC finished wire*

[3] EN 10245-3, *Steel wire and wire products — Organic coatings on steel wire — Part 3: PE coated wire*

[4] EN 10245-4, *Steel wire and wire products — Organic coatings on steel wire — Part 4: Polyester coated wire*

[5] EN 10245-5, *Steel wire and wire products — Organic coatings on steel wire — Part 5: Polyamide coated wire*

[6] EN ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets (ISO 527-3:1995)*

[7] EN ISO 527-4, *Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotopic fibre-reinforced plastic composites (ISO 527-4:1997)*

[8] EN ISO 527-5, *Plastics — Determination of tensile properties — Part 5: Test conditions for unidirectional fibre-reinforced plastic composites (ISO 527-5:2009)*

[9] EN ISO 6272-1, *Paints and varnishes — Rapid-deformation (impact resistance) tests — Part 1: Falling-weight test, large-area indenter (ISO 6272-1:2002)*

[10] EN ISO 6272-2, *Paints and varnishes — Rapid-deformation (impact resistance) tests — Part 2: Falling-weight test, small-area indenter (ISO 6272-2:2002)*

[11] ISO 2809, *Paints and varnishes — Determination of light fastness of paints for interior use*

[12] BS 2782-3, *Methods 320A to 320F Methods of testing plastics. Mechanical properties. Tensile strength, elongation and elastic modulus*

[13] ASTM D638-10, *Standard Test Method for Tensile Properties of Plastics*

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